



National Health Security

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The terrorist use of *Bacillus anthracis* in the wake of the September 11 attacks heightened the national awareness of the threat posed by bioterrorism. It is also true, however, that the formerly clear lines between criminal uses of biological threat agents and natural disease outbreaks have become blurred. The advent of new diseases such as the acquired immune deficiency syndrome, or AIDS, and the severe acute respiratory syndrome, or SARS, the development and rapid spread of antibiotic-resistant *Mycobacterium tuberculosis*, and the rapid spread of West Nile virus are vivid reminders of our society's acute vulnerability to infectious diseases, regardless of whether those diseases arise naturally or by design.

The inevitability of emerging and reemerging diseases and the possibility of bioterrorism dovetail with increased health-care spending in the United States. Health costs now represent 14.1 percent of the gross domestic product, and in 2001, \$1.42 trillion was spent on health care. The economics alone invite a new approach to national health.

Advances in microbiology and computational science, in addition to those in secure communications, provide a compelling opportunity for detecting and combating disease through a national, and eventually international, health-security program. The goals of such a program would be the early detection of a natural epidemic or terrorist incident, appropriate diagnostic evaluation of affected individuals, identification of effective

treatment (secondary prevention), and implementation of appropriate primary prevention and control strategies.

National health security may be possible because technology that will allow cost-effective global surveillance and response is rapidly being developed. A comprehensive environmental monitoring system for detecting infectious agents in air, water, and food sources, coupled with population-based medical surveillance, could result in early identification of the initial phase of a natural or intentional epidemic or incident. Early warning makes it possible for the health care system to assess the medical and public health significance of these events and to respond as appropriate. Monitoring the population holds the potential for achieving the vision of dual-use systems that will help maintain and improve public health while allowing quick response to bioterrorist acts.

Although the availability of sensitive and specific sensors is central to this vision, just as critical is the capacity for high-throughput laboratory analysis and algorithms for analyzing the large body of data that will be produced in real time. But the age of modern medicine is fueled by rapidly advancing molecular applications of genomics, proteomics, and information management and analysis (or bioinformatics), as well as high-throughput screening of candidate vaccines and therapeutics. In this context, developing biomedical tools to reduce morbidity, mortality, and health care costs can become a reality.

In addition to facilitating effective response to biological threats in the United States, a national health security program can provide biomedical tools and systems for the developing world, where many of the potential bioterrorist agents are endemic and are a major cause of morbidity and mortality. Implementing a national health security program can therefore reduce the degree of economic and social asymmetry between developed and developing nations that fuels international bioterrorism.

Ironically, the challenge presented to us by bioterrorism, intensified by rapid scientific advances in biotechnology, creates a crossroad between the threat of disease and the promise of national, if not global, health security. If society is to enjoy the potential long-term benefits afforded by current and future technological advances, the public health and national security communities will have to work hand in hand. Being the wealthiest country in the world, the United States has a unique role to play in determining which path the world will follow. ■

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